

REMARKS

Claims 1 through 27 are pending in the application. Claim 1 is an independent claim with claims 2 through 13 depending therefrom. Claim 14 is an independent claim with claims 15 through 20 depending therefrom. Claim 21 is an independent claim with claims 22 through 27 depending therefrom.

Claims 1-3, 5, 6, 14, 16, 17, 21, and 23-27 stand rejected under 35 U.S.C. § 103(a) in view of Marner '572 in combination with the published application to Horner-Richardson (Horner-Richardson '333), as set forth in pages 2 and 3 of the Office Action. Claims 14, 15, and 22 stand rejected under 35 U.S.C. § 103(a) in view of the combination of Marner '572, Horner-Richardson '333, and Lu '095, as set forth in page 3 of the Office Action. It is respectfully submitted that all of the pending claims are allowable over the base combination of Marner '572 and Horner-Richardson '333, as set forth in greater detail below.

The claims of the present application are drawn to a unique system in a plasma arc torch for aligning, centering, and connecting concentrically oriented components, particularly consumable components. The unique system according to the invention may result in significant advantages, particularly to provide a more precise cutting operation and significantly increase the life of the consumable components. The system of the invention is meant to improve upon the typical threaded connection of concentric components in plasma arc torches as disclosed in Marner '572. Horner-Richardson '333 does not provide motivation, teaching, or suggestion to in any way modify the conventional threaded type connection disclosed in Marner '572 in accordance with the present claims.

Claim 1 of the present application calls for the plasma arc torch to have first and second components in coaxial relationship with each other. The second component has a bore defined therein into which a longitudinally extending connection end of the first component extends. This bore includes a contact surface defined substantially perpendicular to the longitudinal axis of the torch. The longitudinally extending connection end of the first consumable component includes a contact shoulder that is also perpendicular to the axis of the torch, a locking engagement section configured to engage with the second component and draw the contact shoulder against the contact surface of the second component, and an alignment section that extends longitudinally from the engagement section. The alignment section has a diameter that closely matches that of at least a portion of the bore such that any degree of axial misalignment between the consumable components is due to dimensional machining tolerances between the outer circumferential surface of the alignment section and the inner circumferential surface of the bore.

The references of record, particularly Horner-Richardson '333, do not teach or suggest to alter or modify the threaded connection as disclosed in Manner '572 to include an alignment section in addition to the threaded connection section. It is important to understand that the "locking engagement section" of claim 1 may be a threaded section, as particularly seen in Fig. 8 of the present application. However, the claim also calls for an additional "alignment section" that has a diameter that closely matches that of the bore in the other consumable component. The alignment section plays a significant roll in centering of the components due to the fact that the machining tolerances between the alignment section and the bore can be more precisely

controlled. Referring to Horner-Richardson '333, it can readily be determined that this reference does not disclose any sort of connection between concentrically arranged components that utilizes the combination of perpendicular contacting surfaces between the components, a locking engagement section, and an alignment section having a diameter closely matching that of a bore into which the first consumable component is inserted. Referring to Figs. 1 and 5 of the reference, the component identified as reference character 87 is actually a sleeve of insulation material that is inserted into the bore of the cathode 33. The sleeve 87 plays no part in centering of any component within the torch. The sleeve 87 leaves an exposed contact surface 89 to function as an electrical contact surface for the electrode 37 that is inserted at least partially into the bore of the cathode. The electrode 37 is shown in its displaced position in Fig. 5, and in its inserted position in Fig. 1. Referring to Fig. 1, it can be readily seen that, once inserted, the electrode 37 has a rounded protrusion 119 that contacts the exposed contact surface 89, but includes no other surface that serves to align the electrode 37 within the bore of the cathode 33. A gas distributing collar 103 includes a shoulder 111 that engages against an annular seat 115 of the insulator 39. However, the insulator 39 is not a component of the cathode 33. Also, there is no alignment section of the electrode 37 having a diameter that closely matches the diameter of any portion of the cathode into which the electrode is inserted.

Accordingly, it should be appreciated that even if a combination were made between Marner '572, and the system of Horner-Richardson '333, such combination is not in accordance with claim 1 of the present application.


Claim 14 of the present application includes similar limitations to claim 1. In particular, claim 14 specifically calls for the components to be an electrode and a cathode body into which the electrode is inserted. The electrode includes the longitudinally extending connection end with a contact shoulder, a threaded engagement section, and an alignment section having a diameter closely matching that of a bore in the cathode body. Accordingly, claim 14 is allowable over the applied combination of references for at least the reasons set forth above with respect to claim 1.

Claim 21 is an independent claim drawn to the electrode component of the plasma arc torch, and calls for the electrode to have a connection end that is insertable into a bore in the cathode body. The connection end includes a contact shoulder, a threaded engagement section, and a longitudinally extending alignment section that extends rearwardly from the threaded section and that has a diameter that is less than the threaded section and that closely matches that of a bore in the cathode body into which the connection end of the electrode is to be inserted. The electrode in the Marner '572 or Horner-Richardson '333 references do not include such structure. Accordingly, claim 21 is allowable for essentially the reasons set forth above in the discussion of claims 21 and 14.

Accordingly, for the reasons set forth herein, applicants respectfully submit that all pending claims are allowable over the art of record and that the application is in condition for allowance. Favorable action thereon is respectfully requested. The Examiner is encouraged to contact the undersigned at his convenience to resolve any remaining issues.

Respectfully submitted,

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